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TITLE: Electrode for LCD panel - comprises EVA copolymer layer on one face of optically anisotropic transparent base film, hardened resin layers either side of base and transparent conductive layer

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ABSTRACTED-PUB-NO: JP07333630A
BASIC-ABSTRACT: An ethylene-vinyl alcohol system co-polymer layer is arranged on one face of a transparent base film having optical anisotropy, hardening resin layers are on both faces of the film and a transparent conductive layer is formed on one face of the resin layer.

USE - The film has good chemical resistance, oxygen gas barrier property and moisture resistance.

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS:
ELECTRODE LCD PANEL COMPRISE EVA COPOLYMER LAYER ONE FACE OPTICAL ANISOTROPE
TRANSPARENT BASE FILM HARDEN RESIN LAYER SIDE BASE TRANSPARENT CONDUCTING LAYER

ADDL-INDEXING-TERMS:
ETHYLENE! VINYL! ALCOHOL

DERWENT-CLASS: A89 L03 P81 U14

CPI-CODES: A10-E09B2; A11-B05; A11-C02; A12-L03B; L03-G05B;

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(54) ELECTRODE FILM FOR LIQUID CRYSTAL DISPLAY PANEL

(57)Abstract:

PURPOSE: To improve chemical resistance and gas barrier property by providing one surface of a base film with an ethylene-vinyl alcohol polymer layer and providing both surfaces with cured resin layers and further, providing one surface thereof with a transparent conductive layer.

CONSTITUTION: This electrode film is formed by providing at least one surface of the base film with the ethylene-vinyl alcohol polymer layer, then providing both surfaces of the film with the cured resin layers and further, providing one surface thereof with the transparent conductive layer. The ethylene-vinyl alcohol polymer layer is arbitrarily provided with an anchor layer as its ground surface layer. The ethylene-vinyl alcohol polymer to be used is a copolymer copolymerized with an ethylene and vinyl alcohol at an arbitrary ratio. The ethylene and vinyl alcohol may be bonded by either of random and block copolymn. systems. The cured resin layers are provided by applying a coating liquid contg. a monomer and/or prepolymer having ≥l pieces of carbonto-carbon unsatd. bonds in the molecule by gravure coating, etc., on the film and curing the coating.

LEGAL STATUS

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* NOTICES *

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The electrode film for liquid crystal display panels characterized by preparing an ethylene-vinyl alcohol system copolymer layer at least in one side of this base film, preparing a hardening resin layer subsequently to both sides of a film in the electrode film for liquid crystal display panels with which the transparent conductive layer is prepared at least on the transparent base film of the optical isotropy, and preparing the transparent conductive layer on one side of this hardening resin layer further.

[Claim 2] Furthermore, the electrode film for liquid crystal display panels according to claim 1 with which the support layer which consists of an urethane system resin or a polyester system resin is prepared between the base film and the ethylene-vinyl alcohol system copolymer layer.

[Claim 3] The electrode film for liquid crystal display panels according to claim 1 or 2 with which an ethylene-vinyl alcohol system copolymer layer is formed of the application by the gravure coat.

[Claim 4] The electrode film for liquid crystal display panels of the claim 1-3 to which a hardening resin layer applies to the application liquid which contains in a molecule the monomer and/or prepolymer which have one or more carbon-carbon unsaturated bonds with a gravure coat, and hardens this by irradiation of ultraviolet rays or an electron ray given in any 1 term.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the electrode film for liquid crystal display panels.
[0002]
[Description of the Prior Art] The electrode used for a liquid crystal display panel is In2 O3-SnO2 on a glass substrate. What prepared the layer of a compound (this is hereafter called ITO) is known well. However, in the electrode using such a glass substrate, the shock-proof weakness in the time of conveyance and the problem of the increase of a weight accompanying enlargement of a display panel have arisen, and the improvement has been called for. Then, the organic film substrate (base film) was used as an alternative of a glass substrate, and the thing in which the ITO film was formed on this was proposed.
[0003] However, although properties, such as chemical resistance accompanying that there are not transparency like glass and a polarization property in such a base film and patterning of ITO, are required, there are few base films with which it can be satisfied of these demand properties enough in the present condition. Therefore, an organic layer is applied to both sides of a base film, and the chemical-resistant improvement of a base film is aimed at. Moreover, although a comparatively large resin base penetrable [acid-proof] (oxygen barrier nature) and permeable [-proof] is used for a base film in many cases, the liquid crystal in a film etc. will oxidize and the problem that endurance becomes bad arises. Therefore, the method of coating a base film with a method (JP,60-190342,A) or polyvinyl alcohol etc. which sticks the film excellent in oxygen barrier nature and waterproofness is proposed. However, in what is depended on these methods, the sufficiently good thing was not obtained in respect of an optical anisotropy, a gas barrier property, film smooth nature, and the heat-resistant property.
[0004] Then, this invention is the optical isotropy and aims at offering the electrode film for liquid crystal display panels which was moreover excellent also in chemical resistance and gas barrier nature.
[0005]
[Means for Solving the Problem] this invention offers the electrode film for liquid crystal display panels characterized by preparing an ethylene-vinyl alcohol system copolymer layer at least in one side of this base film, preparing a hardening resin layer subsequently to both sides of a film, and preparing the transparent conductive layer on one side of this hardening resin layer further in the electrode film for liquid crystal display panels with which the transparent conductive layer is prepared at least on the transparent base film of the optical isotropy.
[0006] as the base film used by this invention -- the optical isotropy -- and although it will not be limited especially if excelled in visible light-transmission nature, films, such as a polycarbonate, a polyarylate, an amorphous polyolefine, for example, polyethylene, polypropylene, a triacetyl cellulose, polyether sulphone, a polysulfone, polyester, for example, a polybutylene terephthalate, a polyimide, a polyvinyl chloride, the poly fluoride vinyl, an acrylic resin, a polyether ketone, and a nitril phenol, are mentioned, for example
[0007] As a ground layer of an ethylene-vinyl alcohol system copolymer layer, a support layer is

prepared arbitrarily. Therefore, when an ethylene-vinyl alcohol system copolymer layer is prepared in both sides of a base film, a support layer is also prepared in both sides at one side of the side same again in the case of one side. A polyester system resin, a resin, for example, an urethane system resin, well-known as a ground layer, etc. can use it for a support layer preferably. Although it is desirable that formation of a support layer performs the application by the gravure coat simultaneously with formation of the ethylene-vinyl alcohol system copolymer layer on this layer, without problems, such as blocking, arising, each class can also be formed separately. In an application, it is desirable that the formed element of application liquid is 20 or less % of the weight, and, as for the thickness of a support layer, it is desirable that it is 1 micrometer or less.

[0008] An ethylene-vinyl alcohol system copolymer layer is prepared on the support layer preferably described above to one side or both sides of a base film. Ethylene and vinyl alcohol are the copolymers copolymerized by arbitrary ratios, and the ethylene-vinyl alcohol system copolymer used may combine randomness, the block, etc. in which copolymerization format. The thickness of an ethylene-vinyl alcohol system copolymer layer has desirable 6 micrometers or less, and it is 5-2 micrometers more preferably. If an ethylene-vinyl alcohol system copolymer is compared with the good polyvinyl alcohol of the conventional oxygen barrier nature etc., it can improve oxygen barrier nature and moisture permeability sharply. Therefore, an optical property is improved by making it a thin layer. Formation of an ethylene-vinyl alcohol system copolymer layer can be performed for example, by the gravure coat method. Under the present circumstances, as for application liquid, it is desirable to hold the degree of solution temperature at 40-70 degrees C by the increase of viscosity, at a room temperature, since the application is difficult. Moreover, the formed element of application liquid has 6 desirable % of the weight or more.

[0009] Next, the hardening resin layer prepared in both sides of a film applies the application liquid which contains in a molecule the monomer and/or prepolymer which have one or more carbon-carbon unsaturated bonds with a gravure coat etc., and is prepared by hardening this. Hardening by irradiation of ultraviolet rays, an electron ray, etc. is desirable. Irradiation conditions can use the conditions of common use. As a prepolymer, a unsaturated polyester, epoxy denaturation poly (meta) acrylate, urethane denaturation poly (meta) acrylate, and polyester denaturation poly (meta) acrylate are mentioned, for example. Moreover, as a monomer, univalent or the acrylic-ester (meta) monomer of polyhydric alcohol can be used. For example, lauryl (meta) acrylate, allyl-compound (meta) acrylate, Monochrome (meta) acrylate, such as 2-hydroxyethyl (meta) acrylate; 1, 3-butane JIORUJI (meta) acrylate, 1, 6-hexane JIORUJI (meta) acrylate, polyethylene-glycol 200 di(meth)acrylate, Neopentyl GURIKORUJI (meta) acrylate, tripropylene GURIKORUJI (meta) acrylate, Di(meth)acrylate, such as tetrapod ethylene GURIKORUJI (meta) acrylate; TORIMECHI roll pro pantry (meta) acrylate, Polyfunctional (meta) acrylate, such as TORI (meta) acrylate [, such as pen TAERISURITORUTORI (meta) acrylate,]; and pentaerythritol tetrapod (meta) acrylate, and pentaerythritol hexa (meta) acrylate, is mentioned. Moreover, in addition to this, polymerization nature unsaturated compound which has amide group or non-ring type amino group, for example, N, and N-dimethyl (meta) acrylamide, N vinylpyrrolidone, N, and N-dimethylamino propyl (meta) acrylamide, a diacetone (meta) acrylamide, etc. are mentioned in a molecule. These prepolymers or monomers may be used independently, and two or more sorts may be combined and they may be used.

[0010] The thickness of a hardening resin layer has desirable 0.4-5 micrometers. A hardening resin layer is prepared in both sides of a film. the case where the above-mentioned ethylene-vinyl alcohol copolymer layer is prepared only in one side although each hardening resin layer is prepared on an ethylene-vinyl alcohol copolymer layer when the above-mentioned ethylene-vinyl alcohol copolymer layer is prepared in both sides -- a hardening resin layer -- one side -- an ethylene-vinyl alcohol copolymer layer top -- and another side is directly prepared on a base film Although you may prepare directly on an ethylene-vinyl alcohol copolymer layer when a hardening resin layer is prepared on an ethylene-vinyl alcohol copolymer layer, after preparing a support layer on an ethylene-vinyl alcohol copolymer layer, a hardening resin layer can also be prepared on it. In that case, even if a support layer is the same as said support layer, they may differ. The transparent conductive layer prepared on a

hardening resin layer may be in which [of a base film] side. That is, when the aforementioned ethylene-vinyl alcohol copolymer layer is prepared only in one side, even if it is the side in which the ethylene-vinyl alcohol copolymer layer is prepared, you may be it and an opposite side. As a transparent conductive layer, the material of the transparent conductive layer of common use, for example, a metallic oxide, can be used. concrete -- for example, a SnO2, ZnO, and CTO system (CdSnO3, Cd2 SnO4, and CdSnO4), In 2O3, and CdIn 2O4 etc. -- it is mentioned It is the compound (dope) phase which added one sort chosen as the desirable above-mentioned metallic oxide from Sn, Sb, F, and aluminum, or two sorts or more. Things desirable also in it are In 2O3 (ITO) which added Sn, SnO2 which added Sb, SnO2 which added F, ZnO which added aluminum. A transparent conductive layer can use these layers by the monolayer or the multilayer. 200-5500A of thickness is desirable, and it is 300-3000A more preferably. Moreover, if sheet resistance of a transparent conductive layer is below 400ohms / **, there will be especially no limit. A transparent conductive layer can be prepared by the well-known producing-film method, for example, a vacuum deposition, the spatter, the ion plating method, CVD, the spray method, etc.

[0011] As for the electrode film for liquid crystal display panels of this invention obtained in this way, it is desirable that all the light transmissions in the light are 75% or more as a whole. Moreover, although degradation of the permeability by layer formation has the fewer desirable one, as compared with a base film, what is necessary is just 8% or less.

[0012]

[Example] The following examples explain this invention in more detail.

At the 10 % of the weight of the amounts of formed elements, by the gravure coat method, the resin liquid for support layers (Oriental Morton; base-resin ADCOTE- 335A and curing agent CAT- 10) was applied to one side of a polyarylate film (a base film, Kanegafuchi Chemical Industry; ERUMEKKU) with an example 1 thickness of 100 micrometers so that thickness might be set to 0.5 micrometers. Subsequently, on this application layer, heating the application liquid for ethylene-vinyl alcohol copolymer layers (Nippon Synthetic Chemical Industry; SOANORU - 16D) so that temperature may become 52 degrees C, it applied so that thickness might be set to 3 micrometers by the gravure coat method. Then, the resin liquid (Dainichiseika Colour & Chemicals Mfg.; EXF- 51) which changes from an epoxy system monomer to both sides of a film was applied by the gravure coat method, this was hardened by ultraviolet-rays (UV) irradiation, and the hardening resin layer was formed. The thickness of a hardening resin layer was 2 micrometers. Next, the ITO layer (transparent conductive layer) was formed in the side in which the ethylene-vinyl alcohol copolymer layer is not prepared by the ion plating method on the hardening resin layer of film one side. In a target, it is In 2O3. SnO2 Reactant gas used the mixed gas (Ar/O2 =90/10; volume ratio) of an argon and oxygen using the powder sintered compact (weight ratio 90:10). The thickness of an ITO layer was 1400A. Sheet resistance of a transparent conductive layer was 100ohm/** (it measures in a four probe method).

[0013] In this way, the electrode film which has the composition of a hardening resin layer / ethylene-vinyl alcohol copolymer layer / support layer / base film / hardening resin layer / ITO layer was obtained. The property of this electrode film was investigated. A result is shown in Table 1.

Like the example 1, the same support layer was prepared so that it might become 0.4 micrometers of thickness, and the same ethylene-vinyl alcohol copolymer layer (3 micrometers of thickness) was formed like the example 1 on it at both sides of a polycarbonate film (Teijin, Ltd. make) with an example 2 thickness of 100 micrometers (to namely, film both sides). Subsequently, the same support layer (0.3 micrometers) as the above was formed like the above on this (to film both sides). Next, the same hardening resin layer (2 micrometers of thickness) was formed like the example 1 on this support layer (to film both sides). Furthermore, the same ITO layer was formed like the example 1 on the hardening resin layer of film one side. The thickness of an ITO layer was 1400A. Moreover, sheet resistance of an ITO layer was 100ohm/**.

[0014] In this way, the electrode film which has the composition of a hardening resin layer / support layer / ethylene-vinyl alcohol copolymer layer / support layer / base film / support layer / ethylene-vinyl alcohol copolymer layer / support layer / hardening resin layer / ITO layer was obtained. The property of

this electrode film was investigated like the example 1. A result is shown in Table 1.
Instead of the application liquid for example of comparison 1 ethylene-vinyl alcohol copolymer layers, used polyvinyl alcohol resin application liquid (the Nippon Synthetic Chemical Industry Co., Ltd. make, solution of Gosenol N (8% of concentration)), and the application layer of 3 micrometers of thickness was prepared, and also the electrode film was manufactured like the example 1.
[0015] In this way, the electrode film which has the composition of a hardening resin layer / polyvinyl alcohol resin layer / support layer / base film / hardening resin layer / ITO layer was obtained. The property of this electrode film was investigated like the example 1. A result is shown in Table 1.
[0016]
[Table 1]

表 1

	実施例1	実施例2	比較例1
可視光透過率（%）*1	87	87	87
リターデーション値(nm)*2	7	28	7
酸素バリアー性（ml/m² ・日）*3			
20℃／50%RH	2.5	0.8	13
20℃／95%RH	4.0	1.2	160
透湿率(g/m² ・日）*4			
20℃／90%RH	3	1	240
鉛筆硬度*5	4 H	4 H	4 H

[0017] The test method in a table is as follows.
[0018] *1 Visible light transmittance : it is measurement *2 at the Shimadzu make and a hazemeter. Retardation value: It is measurement *3 with the Kanzaki Paper Mfg. make and an automatic birefringence meter. Oxygen barrier nature: The gas-chromatography method. Measurement *4 Moisture permeability: It is measurement *5 by the moisture-sensitive sensor method. Pencil degree of hardness: JIS K5406-1990 It followed, and when [which was measurement] the electrode film of examples 1-2 was built into the liquid crystal display panel, it was satisfactory to the operation as an electrode film.
[0019]
[Effect of the Invention] The electrode film for liquid crystal display panels of this invention is the optical isotropy, and since it is moreover excellent also in chemical resistance, oxygen gas barrier nature, and moisture permeability-proof, its usefulness is industrially high.

[Translation done.]